



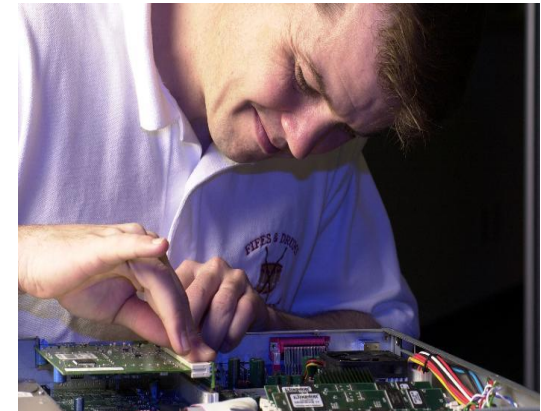
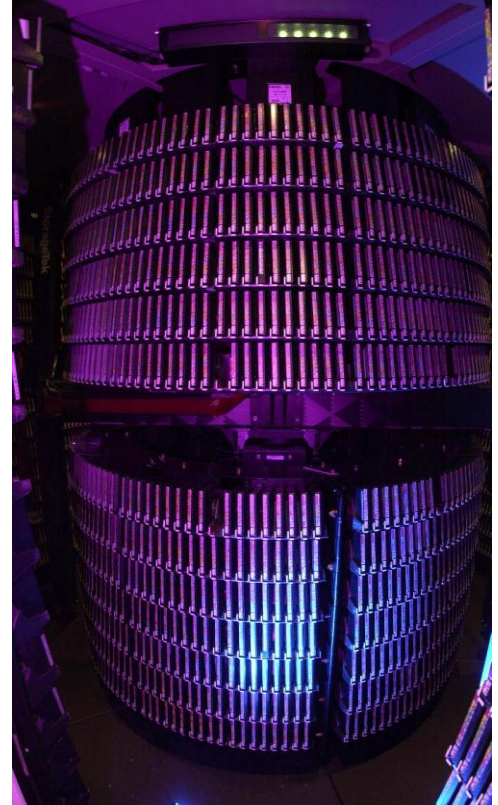
Supporting Transformative Research Through Community Cyberinfrastructure (CI)

Gary Crane, SURA Director IT Initiatives

SURA Mission

SURA is a 501(c)3 university association with 64 member institutions whose mission is to:

- Foster excellence in scientific research
- Strengthen the scientific and technical capabilities of the nation and the Southeast
- Provide outstanding training opportunities for the next generation of scientists and engineers

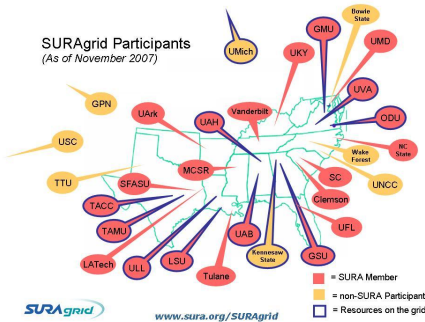
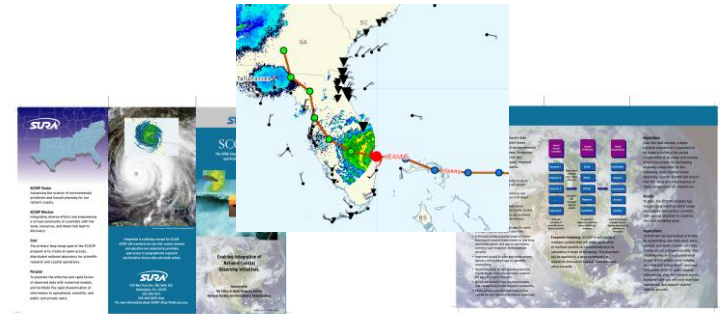


SURA Programs



Jefferson Lab - DOE Office of Science - to probe nucleus of atom and study quark structure of matter

SCOOP - DOD Office of Naval Research/NOAA - to provide IT “glue” to integrate coastal research components



Information Technology - to build cyberinfrastructure foundation (the integration of high performance computing and networking) to support SURA's scientific and research programs

Relations - to formulate and sustain internal and external relations strategy and support for SURA's scientific and research programs



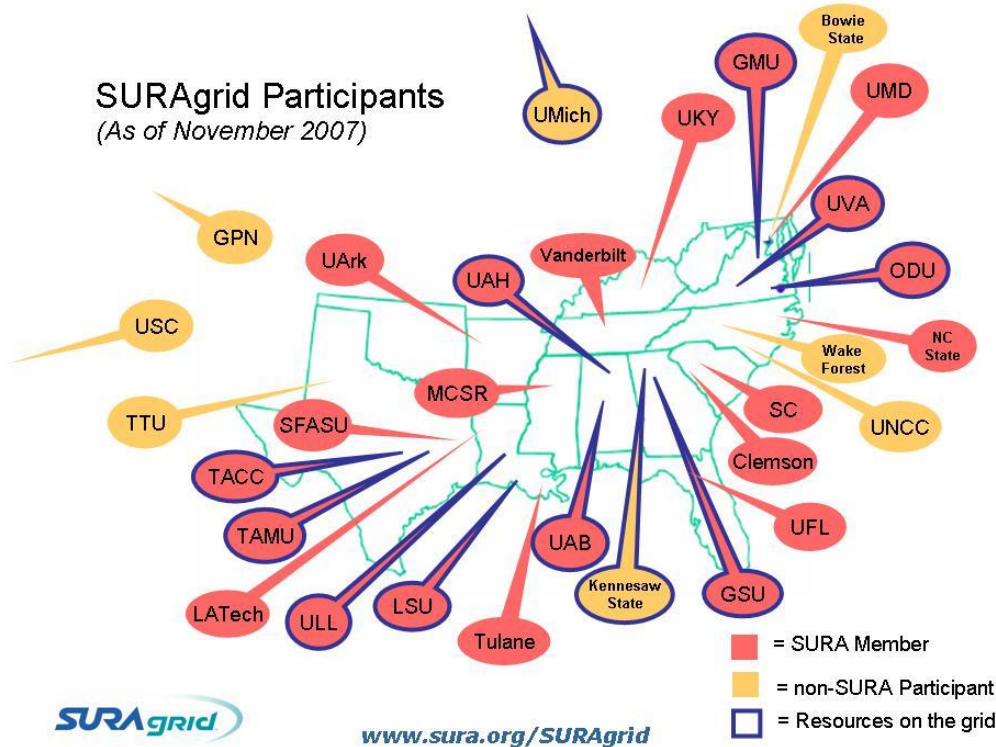
SURA Region

- ❑ 10 EPSCoR, 92% HBCU,
- ❑ 22% HSI, **12% NSF SUs!**
 - 4:1 ratio SUs/per capita
- ❑ SURA responds
 - Promotes regional CI, apps
 - Optical nets, SURAggrid, HPC vendor partnerships, SCOOP
 - New FTEs support SURAggrid, app projects (e.g. SCOOP)
 - Partners with LSU (Delta Project) and Blue Waters
- ❑ NSF opportunity: New CI research communities, new science, outreach, growth



Lowering Barriers for Deploying and Utilizing CyberInfrastructure

SURAgriid Participants
(As of November 2007)



SURAgriid

- ☐ 31 participating institutions
- ☐ Shared accessible grid computing environment
- ☐ Enabling CI supported research & education
- ☐ On-Ramp to National CI
- ☐ Access to group negotiated discounted HPC systems

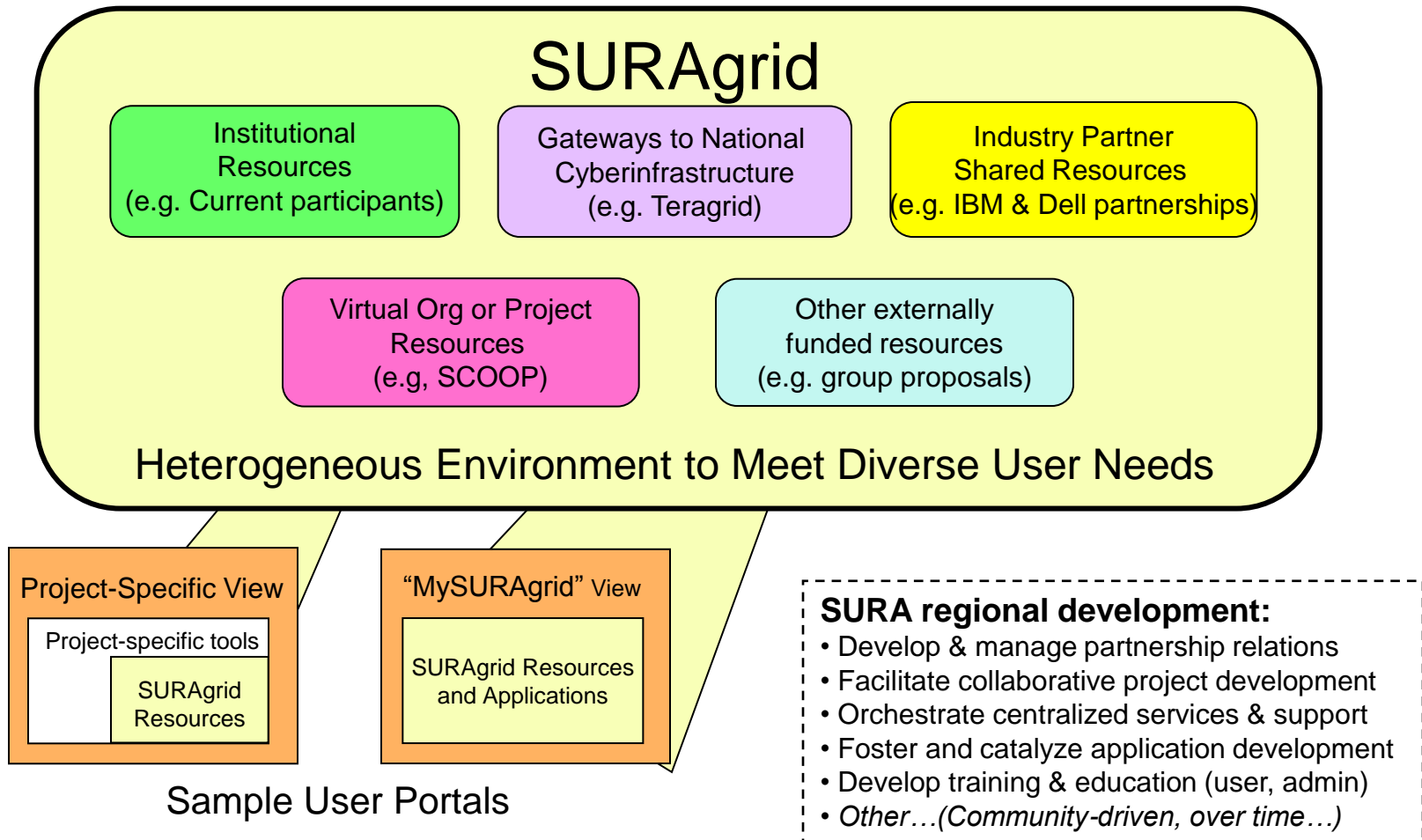
About SURAGrid

- ❑ Open initiative in support of regional strategy and infrastructure development
 - Applications of regional impact are key drivers
- ❑ Designed to foster new uses and users of CI
 - Collaborative research, large and small
 - Applications beyond those typically expected
 - Instructional use, student exposure, new communities
 - Open to what new communities will bring
 - On-ramp to national HPC & CI facilities (e.g., Teragrid)
- ❑ Built by, and building, a community of institutional collaborators

About SURAGrid

- ❑ Broad view of grid infrastructure
- ❑ Facilitate seamless sharing of resources within a campus, across related campuses and between different institutions
 - Integrate with other enterprise-wide middleware
 - Integrate heterogeneous platforms and resources
 - Explore grid-to-grid integration
- ❑ Support range of user groups with varying application needs and levels of grid expertise
 - Participants include domain scientists, computer scientists IT developers & support staff

SURAgriD Vision



SURAgid Goals

- ❑ To **develop scalable infrastructure** that leverages local institutional identity and authorization while managing access to shared resources
- ❑ To **promote the use** of this infrastructure for the broad research and education community
- ❑ To provide a forum for participants to **share experience** with grid technology, and participate in collaborative project development

How Work Gets Done

- Major component contributors (TACC, UVA, TTU, ODU)
- SURA commitment (SURA Board Level Support for SURAgrid)
- SURAgrid Governance Committee (Elected)
- Working groups

Active

- ☐ SURAgrid Implementation Team
- ☐ SURAgrid Teaching Environment Working Group
- ☐ SURAgrid Accounting WG
- ☐ SURAgrid Software Stack Team
- ☐ SURAgrid SCOOP Applications Deployment Team

On Hiatus

- ☐ SURAgrid Funding Group
- ☐ SURAgrid Environment Variables Working Group

Future?

Major Areas of Activity

- ☐ Grid-Building
- ☐ Access Management
- ☐ Application Discovery & Deployment
- ☐ Corporate Partnerships
- ☐ Outreach & Community

Grid-Building

- ❑ Balancing heterogeneity with interoperability
 - Set minimum requirements and refine upwards
 - Accommodate site standards and conventions
- ❑ Growing capacity
 - Shared resources contributed by participants and through corporate partnerships
 - Expand type of available resources, add gateways

Themes: [heterogeneity](#), [flexibility](#), [interoperability](#)

Grid-Building

□ Portal development

- User interface & resource monitor (TACC/UT Austin)
- Eventual support for multiple community “views”

□ Evolving operations & support

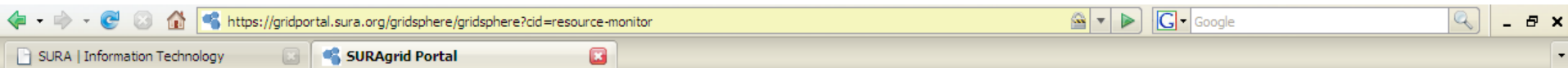
- Growing suite of user documentation
- Packaged stack install
- Beginning accounting system
- Peer support mechanisms
- Developing centralized support strategy

Themes: **heterogeneity, flexibility, interoperability**

Community Cyberinfrastructure

	Institution s	Resources	CPUs	Peak TFlops	GBytes Memory	GBytes disk
September 2005	9	11	490	1.3	548	4755
October 2006	14	18	910	3.1	950	8020
April 2007	13	16	1971	10.5	3324	45609
Feb 2008	12	16	2041	12.6	3626	46677

SURAggrid Portal



Resource Monitor View

Welcome Documentation

Home Resource Monitor Resource Configuration

Grid Information Browser

Refresh

Shared Computing Resources

Name	Institution	System	CPU's	Peak GFlops	Memory GBytes	Disk GBytes	Test Status	Current Load	Current Jobs
ACSrocks	Georgia State University	ACS Dell Dimension 3000 Rocks Cluster	6	37	6	240	Click Here	<div></div>	R-Q-O
AGLT2_UM	University of Michigan	Michigan SURAggrid Gatekeeper	16		32	80	Click Here	<div></div>	R-Q-O
Bandera	The University of Texas at Austin	TACC DGC Cluster	8	48	8	144	Click Here	<div></div>	R-Q-O
Caldlab	Texas A&M University	Caldlab Optiplex Cluster	306	1971	306	3500	Click Here	<div></div>	R-Q-O
CANBlade	University of Louisiana at Lafayette	IBM BladeCenter HS20 Cluster	12	67	20	25	Click Here	<div></div>	R-Q-O
Cheaha	University of Alabama at Birmingham	64-node AMD Cluster	128	384	128	704	Click Here	<div></div>	R-Q-O
ESG1	George Mason University	SURA Condor Pool	34	5	16	700	Click Here	<div></div>	R-Q-O
Grid04	University of Virginia	Dell Rocks Linux Cluster	40	240	60	400	Click Here	<div></div>	R-Q-O
Grid11	University of Virginia	HP Linux Cluster	5	26	5	325	Click Here	<div></div>	R-Q-O
Hydra	Texas A&M University	IBM Cluster 1600	640	4864	1280	8744	Click Here	<div></div>	R-Q-O
Janus	Georgia State University	GSU IBM Power5+, p575	192	1299	384	9200	Click Here	<div></div>	111R-0Q-240
ksu-csgrid01	Kennesaw State University	Kennesaw Dell PowerEdge Xeon Cluster x86_64	14	70	21	490	Click Here	<div></div>	R-Q-O
Mileva	Old Dominion University	Sun Fire X2100 Dual Core Opteron Cluster	8	24	8	25	Click Here	<div></div>	R-Q-O
Pelican	Louisiana State University	IBM SURAggrid Frame at LSU	368	2797	960	19000	Click Here	<div></div>	29R-0Q-150
Scoops	University of Alabama at Huntsville	ADCIRC-2006 Cluster	8	48	8	100	Click Here	<div></div>	R-Q-O
Tensor	Texas A&M University	Tensor Opteron Cluster	256	718	384	3000	Click Here	<div></div>	R-Q-O
Total:			2041	12598	3626	46677			



Resource Configuration View

Welcome Documentation

Home Resource Monitor Resource Configuration

Computing Resource Configuration										
Resource/Host Name	Institution/Contact	CPUs	Architecture	OS Version	Scheduler	Queue	Globus Version	Web Services	Pre-WS	Scheduled Availability
ACSRocks acsrocks1.gsu.edu	Georgia State University/Nicole Geiger	6	Intel Xeon	Linux	LSF				Y	
AGLT2_UM gate02.grid.umich.edu	University of Michigan/Shawn McGee	32 (varies)	Intel Xeon 3.6GHz X86_64	Scientific Linux v4.5	Condor	jobmanager-condor	2.4.3	N	Y	
Bandera bandera.tacc.utexas.edu	The University of Texas at Austin/Patrick Hurley	8	Intel Xeon	CentOS v4.0	LSF	Normal	4.0.1	Y	Y	24x7
Caldlab gauss.math.tamu.edu	Texas A&M University/Steve Johnson	306	X86	SuSe Linux	PBS (Torque)	night	4.0.3	Y	Y	down M-F 8am-6pm
Canblade canbc01.louisiana.edu	University of Louisiana Lafayette/Ian Chang-Yen	12	Intel Xeon	CentOS Linux v4.0	PBS (Torque)	Batch	4.0.2	Y	Y	
Cheaha stage.uabgrid.uab.edu	University of Alabama Birmingham/John-Paul Robinson	128	AMD Opteron	CentOS Linux v4.5	SGE	default	4.0.1	Y	Y	
ESG1 esg1.cos.gmu.edu	George Mason University/Bin Zhou	34	Condor Pool	Redhat Linux AS3	Condor	CISC	4.0.1	Y	N	10pm-8am
Grid04 grid04.itc.virginia.edu	University of Virginia/Steve Losen	20	Intel Pentium 4 and Xeon	Linux Rocks 4.1	SGE		4.0.2	Y	Y	
Grid11 grid11.itc.virginia.edu	University of Virginia/Steve Losen	5	Intel Pentium 4	Linux Rocks 3.3.0			4.x	Y	Y	
Hydra hydra.tamu.edu	Texas A&M University/Steve Johnson	640	Power5+	AIX 5.3	LoadLeveler	TBD	4.0.4	Y	N	24x7
Janus janus.gsu.edu	Georgia State University/Victor Bolet	192	Power5+	AIX 5.3	LoadLeveler	TBD	4.0.1.0		Y	24x7
KSUcsgrid csgrid01.kennesaw.edu	Kennesaw State University/Brian Brooks	14	Intel Xeon	CentOS Linux 2.6.9-22.ELsmp	SGE		4.0.3	Y	Y	
Mileva mileva.hpc.odu.edu	Old Dominion University/Mahantesh Hallapanavar	4	AMD Opteron	CentOS v4.0	PBS (Torque)	Batch	4.0.2	Y	Y	24x7
Pelican pelican.hpc.lsu.edu	Louisiana State University/Archit Kulshrestha	368	Power 5+	AIX 5.3	LoadLeveler	SP5L/MP5L/LP5L	4.0.2	Y	Y	
Scoops scoops.itsc.uah.edu	University of Alabama in Huntsville/Information Technology and Sys	8	Intel Xeon	Linux			2.4.3	N	Y	
Tensor tensor.tamu.edu	Texas A&M University/Steve Johnson	256	AMD Opteron	SuSe Linux 8.2	PBS (Torque)		4.0.1	Y	Y	

Access Management

❑ Two-tiered PKI

- Production service and grid-to-grid integration
- Preserve environment for learning & development

❑ View towards global structures for sharing

- HEPKI, International Grid Trust Federation (IGTF)

❑ Multiple components contributed by UVA

- Bridge Certificate Authority (CA)
- LDAP-based user account management
- SURAGrid CA (under development)

Themes: [local autonomy](#), [scalability](#), [leverage enterprise infrastructure](#)

Application Development

- ❑ Grow to accommodate increasing number & diversity of both applications and users
- ❑ Immediate benefit for scientific and instructional applications that then drive further development
- ❑ Leverage an initial representative application set to illustrate benefits and motivate usage
- ❑ Develop processes for scalable, efficient deployment; assist in “grid-enabling” applications

Themes: broadly useful, beyond typical users and uses

Outreach & Community

- ❑ Incubator for collaborative projects & proposals
- ❑ SURA Cyberinfrastructure Workshop Series
 - SURAGrid role: planning, presenting, attending
 - Most Recent - SURA Grid-enabling workshop, Jan 08
 - In conjunction with annual LSU Mardi Gras Conference
 - http://www.mardigrasconference.org/GEA_workshop.php
- ❑ Development of educational resources
 - NMI Integration Testbed Case Study Series,
http://www.sura.org/programs/nmi_testbed.html#NMI
 - SURAGrid deployment documentation
 - Grid Technology Cookbook (www.sura.org/cookbook/gtcb)

Current Applications

- ☐ Storm Surge Modeling with ADCIRC (SCOOP*)
- ☐ CH3D Storm Surge Monitoring w/Grid Appliance (SCOOP*)
- ☐ Coastal Modeling with Wave Watch 3 (SCOOP*)
- ☐ NCSU Simulation-Optimization for Threat Management in Urban Water Systems
- ☐ ODU Bio-Sim: Bio-electric Simulator for Whole Body Tissue
- ☐ UABgrid Dynamic BLAST
- ☐ GSU Multiple Genome Alignment on the Grid
- ☐ Hampton University Tokamak Divertor Map
- ☐ UDel Climate Modeling with CAM3
- ☐ GSU Virtual Screening for Chemistry

*SURA Coastal Ocean Observing & Prediction program

SURA Corporate Partnerships

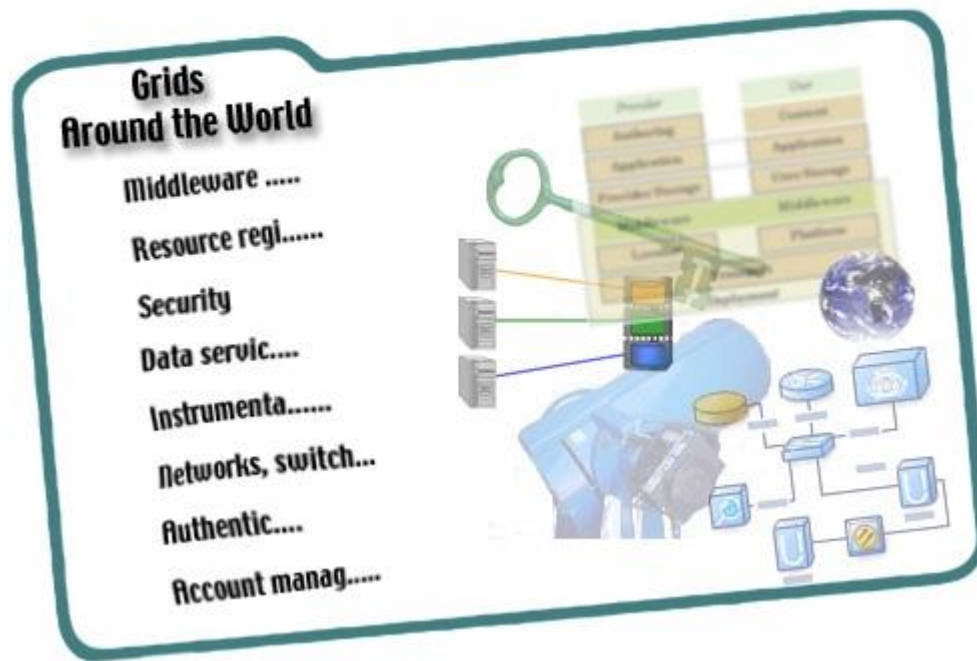


- ❑ IBM p575 - 1 and 2 TF configurations
- ❑ IBM e1350 Linux- 1 rack 3 TF and 2 rack 6 TF configurations
- ❑ Dell PowerEdge 1950- Single rack 2TF configuration
- ❑ Significant product discounts
- ❑ Owned and operated by SURAgriid participants
- ❑ Integrated into SURAgriid with 20% of capacity available to SURAgriid pool
- ❑ AT&T dark fiber access

SURA Grid Technology Cookbook

The Grid Technology Cookbook

a guide to building and using grid resources



www.sura.org/cookbook/gtcb

- ❑ Recently announced:
 - International Science Grid This Week:
<http://www.isgtw.org/?pid=1000764>
 - SURA press release:
<http://www.sura.org/news/docs/Cookbook110707.pdf>
- ❑ Sponsored by SURA, US Army Telemedicine and Advanced Technology Research Center (TATRC) and Open Science Grid (OSG)
- ❑ Community effort with broad participation - contributions and review from regional and national grid experts
- ❑ Modeled after success of ViDe Video Conferencing Cookbook,
<http://www.videnet.gatech.edu/cookbook.en/>

Q & A

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